



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

San Francisco, CA 94105

February 16 2017

Mr. Anthony R. Brown
Environmental Manager
Atlantic Richfield Company
4 Centerpointe Drive, LPR 4-435
La Palma, CA 90623-1066

Re: EPA Comments on Atlantic Richfield Response to Comments and Final Reference Area Work Plan, dated January 19, 2017

Dear Mr. Brown,

The US Environmental Protection Agency (EPA) has reviewed Atlantic Richfield's January 19, 2017 Response to U.S. EPA, LRWQCB, and Washoe Tribe Comments on the Draft Final Reference Area FRI Work Plan and Technical Memorandum – Preliminary Investigations in Reference Study Areas Leviathan Mine Site, Alpine County, California.

This work was submitted to EPA pursuant to Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California (CERCLA Docket No. 2008-18, June 23, 2008).

Background: Atlantic Richfield Company (ARC) provided the Draft Reference Focused Remedial Investigation (FRI) in September 2011. EPA provided written comments on November 21, 2011. EPA required that ARC address EPA comments prior to approval of the draft reference area work plan. Significant issues included direction to evaluate reference conditions for the East Fork Carson River, develop consistent sampling strategies across the various focused remedial investigations (FRI), and ensure DQOs clearly relate decision consequences to the statistical comparison tests to be used. EPA also directed ARC to consider the stakeholder comments received from the Washoe Tribe of Nevada and California, Lahontan Regional Water Quality Control Board, and US Fish and Wildlife Service.

Atlantic Richfield (ARC) provided a response to EPA's comments on February 3, 2012. EPA provided comments on February 9, 2012, stating the response was incomplete. EPA, noted significant unresolved issues including but not limited to: the approaches described in the draft work plan to benthic macroinvertebrate data, and characterization of non-impacted soil and groundwater. ARC maintained a need to complete the preliminary phase reference investigations and preparation of a revised Reference FRI work plan.

On September 11, 2012 ARC provided an Addendum 1 to the Draft Reference Area work plan describing preliminary phase one-time surface water sampling at up to seven candidate reference streams, reconnaissance mapping of sediment, floodplain soil, & habitat at the candidate reference

streams, and reconnaissance of irrigation features associated with Cottonwood Creek at River Ranch.

EPA conditionally approved Addendum 1 on September 13, 2012, and directed ARC to provide the revised Reference FRI DQOs.

On June 14, 2013 ARC issued Addendum 2 to the Draft work plan. Addendum 2 described collection of sediment quality triad data from two locations along Mountaineer Creek.

EPA approved Addendum 2 on June 26, 2013. EPA's approval was limited to those activities in Addendum 2.

On October 6, 2015, ARC and EPA held a technical meeting to discuss development of the Reference FRI work plan and issues associated with reference streams, East Fork Carson River, soil, groundwater and comparison of reference with site data. On February 28, 2015 ARC provided the revised Draft Final Reference FRI Work Plan, and the March 20, 2015 Reference technical memorandum.

On July 10, 2015, EPA provided comments on these two documents, requesting a written item by item response to address eight general comments and 35 specific comments; as well as EPA comments dated November 21, 2011 and EPA comments dated February 9, 2012 within 30 days or by August 8, 2015.

On August 14, 2015, ARC submitted a response to U.S. EPA and LRWQCB Comments.

On February 4, 2016 EPA provided comments on ARC's August 14, 2015 submittal noting that the ARC response was incomplete with one additional general comment. Previous comments that remained outstanding were General Comments G4 thru 8, and Specific Comments 1, 8, 18, 20 and 35. Along with a number of comments from the LRWQCB.

In response, on March 3, 2016 ARC provided

1. Response to U.S. EPA and LRWQCB comments on Atlantic Richfield Responses to Comments on the Draft Final Reference Area Work Plan (Attached and loaded to the Leviathan Mine SharePoint Site);
2. Preliminary version of the Final Reference Area Focused Remedial Investigation Work Plan (Leviathan Mine SharePoint Site); and
3. 2016 Drilling Work Plan (Attached and loaded to the Leviathan Mine SharePoint Site).

On November 18, 2016, EPA submitted a response to ARC's revised draft final Reference Area Work Plan.

On January 19, 2016 ARC provided a written Response. EPA has completed its review and finds that all of the ARC response to all comments are adequate, and provides the following comments:

- **EPA's July 10, 2015 Comment G5 Groundwater: Section 5.3.** EPA requested that ARC remove various historical text and include the rationale for siting reference wells. Pages 56 through 61 (Sections 5.3 and 5.3.1) of the Final Reference FRI work plan seems to contain this information, however there is still historical text included that is not necessary or appropriate for a final standalone workplan document. Please amend as modified in Attachment A: EPA's suggested revisions to Section 5.3.

- Prior to reporting data as reference groundwater data, ARC shall identify the characteristics necessary for a groundwater well to be identified and selected as an appropriate reference analogue. Please update the last paragraph in 5.3 to clarify that the additional well locations have been determined. And add text to clarify criteria for determining if the wells will be included/considered as reference locations. Please note that if the wells do not meet the criteria, the collected data will be used in the assessment of groundwater contamination. In addition to clarifying the text in the workplan itself, ARC and EPA have had discussions on the technical data summary report for Reference Data. The Reference TDSR should include this information in the groundwater section, and be submitted by June 30, 2017.

ARC's response to the RWQCB Reference Area Work Plan comments are adequate. EPA provides the following comments:

- **Previous LRWQCB comment S2: Table Inconsistencies:**
 - Please include a footnote on Table 4-1 and Table 4-2 to indicate that these tables represent the initial selection process that was conducted in 2011 and is not representative of the current selection process.
 - The RWQCB requested clarification on how the total scores were determined in Table 5-4 and how two potential reference reaches (Cottonwood Creek and Leviathan Creek above Station 1) could have the same Total score of 23, but only Cottonwood Creek be selected as a potential reference reach. **ARC's Response:** ARC stated that while both of these reaches have a Total Score of 23, Leviathan Creek above Station 1 was eliminated as a potential reference reach based on this reach being a poor match for downstream habitat. Herbst stated that upstream of Station 1 "the channel is much more narrow, the substrate is dominated by loose gravel and smaller particles, and the temperature is colder." **EPA Response:** Reference concentrations are a range of concentrations and will be fully reviewed against the criteria during the RIFS process EPA acknowledges the elimination of Leviathan Creek above Station 1 as a reference location for macroinvertebrates; however, EPA also questions the consistency of a ranking system that allowed this reach to score just as high as another reach, yet not be selected as reference. Further, Lower Mountaineer Creek (Total Score: 22) might also be a suitable reference reach. EPA considers the full group of all identified reference streams as likely to provide information to identify a range of reference conditions for comparison with site affected streams.

EPA approves this Reference Work plan document, conditional on incorporation of these outstanding comments. Within 30 days, or by March 16, EPA directs ARC to provide a final fully revised Reference Area Work Plan incorporating these comments.

On or before June 30, 2017, please prepare and submit a full complete and final robust Reference Technical Data Summary Report (TDSR). Similar to the Technical Data Summary Report on the Mine Waste, Surface Water, and Groundwater; this is considered part of a draft RI/FS submittal, for inclusion in the RI/FS report. Please fully consider and incorporate all previous EPA comments on the TDSR format. At the same time, EPA recognizes that the data presentation and evaluation will differ, and asks that ARC provide at a minimum, the information in the outline found in Attachment B

EPA looks forward to continuing our discussions on the RIFS schedule. As discussed, ARC will provide the technical data summary report (TDSR) for Stream Sediment/Floodplain Soil; and data submittals for 2016 groundwater and surface water data; by June 30, 2017

If you have any questions, please feel free to contact me at (415) 947-4183 or Deschambault.lynda@epa.gov.

Sincerely,

A handwritten signature in cursive script that reads "Lynda Deschambault". The ink is dark and the signature is fluid, with a large initial 'L'.

Lynda Deschambault
Remedial Project Manager

Cc by electronic Email:

Douglas Carey, California Regional Water Quality Control Board, Lahontan Region

Michelle Hochrein, Washoe Tribe of Nevada and California

David Friedman, Nevada Department of Environmental Protection

Kenneth Maas, United States Forest Service

Tom Maurer, United States Fish and Wildlife Service

Toby McBride, United States Fish and Wildlife Service

Steve Hampton, California Department of Fish and Wildlife

Marc Lombardi, AMEC

ATTACHMENT A: Changes to Section 5.3 of the Reference Area Workplan

5.3 ~~GROUNDWATER~~

~~Although no human health or ecological exposure pathway has been identified for groundwater, on-property groundwater data will be compared to reference groundwater data to evaluate if mining activities have affected on-property groundwater.~~

~~During the 2015 field season, drilling activities were initiated and boreholes advanced at two locations (LOC-35 and LOC-36) (Figure 5-7) for the planned installation of groundwater monitoring wells to evaluate reference groundwater conditions. The drilling and installation of an additional on-property monitoring well at location (LOC-24) (Figure 5-7) was also planned for the 2015 field season. The drilling, installation, and development of these three wells were not completed in 2015 due to the onset of earlier than anticipated winter conditions. The winter storms caused limited site access and unsafe working conditions and led to cessation of site operations for the 2015 field season.~~

The need for additional reference groundwater monitoring wells was discussed with the U.S. EPA and the LRWQCB during an April 30, 2015 Technical Meeting and potential locations were later evaluated in the field. At the time, Atlantic Richfield proposed moving forward with the installation of groundwater monitoring wells at locations LOC-35 and LOC-36 and utilizing the groundwater data from these locations with that from existing RI and historical groundwater-related data (including data from existing monitoring wells and piezometers) to evaluate reference groundwater conditions, inform decisions about whether data gaps exist, and determine the need for additional reference wells (shallow and deep) in other hydrostratigraphic units.

~~As previously stated, drilling~~ Drilling of groundwater monitoring wells at locations LOC-35 (MW-45) and LOC-36 (MW-45) was started in 2015. As described in the 2016 Drilling Work Plan (Atlantic Richfield, 2016c), drilling was completed at these locations and installation of monitoring wells, development, and sampling was performed during the 2016 field seasons. Six additional monitoring wells were also drilled and installed around the perimeter of On-Property Study Area adjacent to Leviathan Creek and Aspen Creek in 2016 in shallow alluvium and bedrock to assess the potential for offsite migration of impacted groundwater. Once validation and data quality assessment is complete for the 2016 groundwater data (including groundwater sampling results from MW-45 and MW-46 and the six additional perimeter monitoring wells), these wells may be considered for reference purposes if they are demonstrated to represent an appropriate analogue for on-property groundwater. A comprehensive analysis of the reference groundwater data consistent with this Final Reference Area Work Plan will be performed when sampling results from the 2016 field season become available.

Amec Foster Wheeler has developed the Reference Area FRI Work Plan to ensure that Atlantic Richfield will be prepared to timely proceed with the installation of additional reference wells once a final decision is made on the number, location, and technical justification for those additional wells, and as soon as applicable regulatory compliance issues have been satisfied. However, by preparing and submitting the Reference Area FRI Work Plan now, Atlantic Richfield is not conceding that all of the additional reference wells recommended by the U.S. EPA in its

February 4, 2016 comment letter are necessary for addressing the objectives of the RI/FS and the applicable Data Quality Objectives, or that all of those wells should or will be installed. Questions about the necessity for and objectives of certain suggested well locations are summarized in Section 5.2.4 below.

5.3.1 Reference Well Locations

This section presents the rationale for the drilling of boreholes and installation of groundwater monitoring wells in the Reference Area during the 2016 field season.

As with other media, the selection of a reference area for groundwater at the site targets areas with geology, alteration, and mineralization similar to the alluvium and deep bedrock in the On-Property Study Area. As described in Section 2.5, the bedrock geology of the Leviathan Mine on-property area has localized mineralized zones at depth that do not occur in most other areas. Based on historical mine documents (Anaconda, not dated, 1951b, and 1969; Blakop, 1936), the mineralized zone that contained the ore body continues from the pit to the southeast (Figure 2-8). Silicified rock (mapped as Tertiary Silicified Iron-Stained Breccia [Tsi]) and often referred to as cap rock that was present above the ore body prior to excavation of the pit is still present at the ground surface southeast of the pit (Herbst and Sciaccia, 1982).

Existing data show that groundwater is present in some areas within the disturbed materials (mine waste), alluvium, and shallow and deep bedrock. Because mine waste does not occur in reference areas, there is no reference analogue for the on-property groundwater in disturbed materials; therefore, the reference groundwater data collection will focus on groundwater in the alluvium and undisturbed bedrock. Monitoring well locations along the perimeter of the on-property study area adjacent to Leviathan Creek and Aspen Creek are shown on Figure 5-7. These monitoring wells will provide groundwater data for alluvium or shallow bedrock and deep bedrock to evaluate reference groundwater conditions.

Piezometers RZ-21 and RZ-22, which are off-property and to the south-southeast of the open pit, were used to collect groundwater samples in previous investigations but are currently in poor condition. Thus, they are not considered appropriate for the reference investigation. For the purposes of the Reference Area FRI Work Plan, groundwater data will be collected from new groundwater monitoring wells installed along the perimeter of the on-property study area adjacent to Leviathan and Aspen Creek.

Existing data show that groundwater is present in some areas within the disturbed materials (mine waste), alluvium, and shallow and deep bedrock. Because mine waste does not occur in reference areas, there is no reference analogue for the on-property groundwater in disturbed

~~minerals. Therefore, the reference groundwater data collection will focus on groundwater in the alluvium and unconsolidated bedrock.~~

~~As with alluvium, the selection of a reference area for groundwater at the site largely agrees with geology, elevation, and mineralization similar to the alluvium and deep bedrock in the On-Property Study Area. As described in Section 2.5, the bedrock geology of the Leviathan Alluvium on-property area has localized mineralized zones at depth that do not occur in most other areas. Based on historical mine documents (Anononno, not dated, 1974b, and 1977; Giffin, 1976), the mineralized zone that contained the ore body continues from the pit to the southeast (Figure 2-6). Gneissified rock (mapped as Tertiary Gneissified Iron-Quartzite Gneiss [Tq]) and alluvium referred to as cap rock) that were present above the ore body prior to excavation of the pit is still present at the ground surface southeast of the pit (Lindahl and Giffen, 1967).~~

The purpose of the exploratory borings is to better characterize subsurface geologic conditions, obtain grab groundwater samples for analysis, and to provide the information needed to install groundwater monitoring wells to characterize reference area conditions.

Monitoring well locations were selected to further evaluate groundwater conditions in the Aspen Creek Study Area, characterize reference groundwater conditions upgradient of the On-Property Study Area, and provide information about potential migration of groundwater at the perimeter of the On-Property Study Area near Aspen and Leviathan creeks. Existing geologic and topographic maps, geologic cross sections, borehole logs, groundwater quality data, estimates of groundwater flow directions, and evaluation of the effect of discharge into underground workings beneath the Pit on local groundwater levels were also evaluated. The additional groundwater monitoring well locations in areas adjacent to Aspen and Leviathan creeks are intended to provide relevant information about the potential for offsite migration of groundwater and the characterization of shallow groundwater in bedrock and alluvium. These monitoring wells are in addition to the previously proposed reference groundwater monitoring wells, which focus on the characterization of groundwater in mineralized, non-mine influenced bedrock (Atlantic Richfield, 2016e).

During the March 25, 2016 technical meeting, the U.S. EPA and LRNOCB stated that the rationale for installing the additional groundwater monitoring wells was to characterize groundwater to the north, east, and west of the site to provide water level data to further the assessment of the direction of groundwater flow near the perimeter of the on-property areas of the site. Given the topography and hydrogeologic setting, these data are anticipated to confirm the conceptual model that groundwater flow generally mimics topography in the area of the site and groundwater that flows towards the creeks and topographic lows. In a letter dated May 17, 2016, the U.S. EPA provided the following justification for the installation of monitoring wells described for this investigation and indicated that the proposed monitoring well locations are necessary to:

- a. Confirm the assumptions regarding lack of off-site migration of contaminated

groundwater at Aspen and Leviathan creeks used to formulate the current conceptual site model.

- Provide a sufficient number of reference groundwater samples to support comparison with site-affected groundwater.

- Provide reference samples of shallow groundwater.

Based upon the March 22 technical meeting and subsequent field reconnaissance, several changes to the proposed reference well locations were made as noted below:

- The well at previously suggested location LOC-41 was eliminated because of redundancy with locations LOC-40B and LOC-40D.

- The U.S. EPA proposed moving location LOC-37 approximately 500 feet southwest from the previously suggested location, closer to the road. Field reconnaissance was performed on June 8 and 30, 2016, to evaluate potential locations that would allow better technical evaluation of groundwater flow and hydraulic gradients in conjunction with data collected from the other proposed wells in the area. A revised location for well location LOC-37 is shown on Figures 2 and 3.

- The U.S. EPA proposed moving location LOC-39 approximately one-half mile south of the previously requested location, closer to Aspen Creek, and revised their request to now include both shallow and deep wells (LOC-39S and LOC-39D) at this location.

- Field reconnaissance of the U.S. EPA suggested well location LOC-39 was performed on April 7, April 24, and June 8, 2016. Revised locations for wells LOC-39S and LOC-39D that meet the objectives for these wells are shown on Figures 2 and 3.

- Based upon field reconnaissance on April 7 and 24, 2016, locations LOC-40B and LOC-40D have been moved northeast to an area more proximal to Aspen Creek. Relocation of the U.S. EPA suggested locations was needed because of lack of access and available space for drill pad construction, drilling, and well construction. Revised locations for LOC-40C and LOC-40D are shown on Figures 2 and 3.

- A preliminary field reconnaissance of the location for LOC-41 (previously identified as LOC-42 in the draft version of this Drilling Work Plan) was conducted on April 24, 2016, to evaluate access conditions and better site the well. Based upon the April 24, 2016 field reconnaissance, proposed location LOC-41 was moved south to the area shown on Figures 2 and 3.

- This Drilling Work Plan has also been modified to revise the objectives for well locations LOC-39D and LOC-40D. The revised objectives include the option to use encountered groundwater levels in shallower wells LOC-39S and LOC-40B to make decisions regarding the necessity to drill and constructing their deeper counterparts (LOC-39D and LOC-40D). The installation decision criteria for these two monitoring wells are summarized below.

Revised objectives for the monitoring wells, incorporating input provided during the March 22, 2016 technical meeting and subsequent U.S. EPA comments dated May 17, 2016, are listed in Table 47 of the 2AP in Appendix E. Figure 5-7 shows the proposed monitoring well locations

and site geology. The figures and tables contain all of the potential locations suggested for evaluation by the U.S. EPA.

At this site, water levels in developed monitoring wells are not always similar to water levels observed in open boreholes during drilling. Consequently, water levels in the relatively shallower monitoring wells at locations LOC-398 and LOC-408 will be obtained after these wells have been constructed and developed. The top of well screens for monitoring wells at locations LOC-398 and LOC-408 will be targeted below the elevation of the nearby creeks (see Table 17 of the SAP in Appendix E) to ensure that the screened intervals will not extend across the bottom elevation of the creek.

Water levels from the newly installed and developed monitoring wells at locations LOC-398 and LOC-408 will be compared to surface water elevations in nearby Aspen Creek. If water level elevations in the shallower monitoring wells are higher than the elevation of surface water in nearby Aspen Creek, Atlantic Richfield recommends that the deeper, co-located monitoring wells not be installed because groundwater would be interpreted to be flowing toward Aspen Creek. If water level elevations in the shallower monitoring wells are not higher than surface water in nearby Aspen Creek, then the deeper, co-located wells should be installed to obtain vertical groundwater gradient information.

Groundwater monitoring wells were installed and sampled at locations LOC-35 (MW-46) and LOC-36 (MW-45) as described in the Reference Area Work Plan (Atlantic Richfield, 2016c) and the 2016 Drilling Work Plan (Atlantic Richfield, 2016c) during the 2016 and 2016 field seasons. The groundwater data from these wells is undergoing validation and data quality assessment and will be reported in the Draft RI/FS report.

Six monitoring wells were installed around the perimeter of On-Property Study Area adjacent to Leviathan Creek and Aspen Creek and sampled in 2016 in shallow alluvium and bedrock to assess the potential for offsite migration of impacted groundwater. Once validation and data quality assessment is complete for the 2016 groundwater data, these wells could also be considered for reference purposes if they are demonstrated to represent an appropriate analogue for on-property groundwater. A comprehensive analysis of the reference groundwater data consistent with the Final Reference Area Focused Remedial Investigation Work Plan will be performed when sampling data from the 2016 field season become available.

**ATTACHMENT B: Outline for the Floodplain
Soil and Sediment Technical Data Summary
Report for June 30, 2017**

Executive Summary

Introduction

Site Description

Site

SSAs

EFCR

Affected Media

Site

SSAs

EFCR

Reference Sampling Locations (brief summary text, show on figures)

Site

SSAs

EFCR

Surface Water

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Groundwater

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Stream Sediment

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Storm Water

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Snow Melt Runoff

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Floodplain Soil

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Fish Tissue

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Plant Tissue and Associated Root Zone Soil

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Terrestrial Soil

Field Sampling Summary (with summary analytical tables)

DQA

Exploratory Data Analysis

Estimation of Reference Concentrations (tell us how the concentrations were estimated and provide a summary table)

Comparison Discussion

Comparison with ARARs

Media specific descriptions of suggested statistical methods for comparison of reference data with site affected data sets for the Human Health and Ecological risk assessments.

Tables

Figures

Appendices

Lab Reports &c

Reference DQA

Statistical Analyses